Abstract: Ternary imidazolin-5-one molecule/P3HT: PCBM planar-bulk hetero-junction devices were fabricated for this work. The films were subjected to annealing at different temperatures between 100 to 200 C and the effects of the annealing temperature on the device parameters were studied. The optimal annealing temperature was found to be 165 C which resulted in the highest ternary organic solar cell efficiency of 3.9%.